

Dec. 20, 1966

R. STUART

3,292,828

EASY OPENING CAN END

Filed Sept. 17, 1964

FIG-1

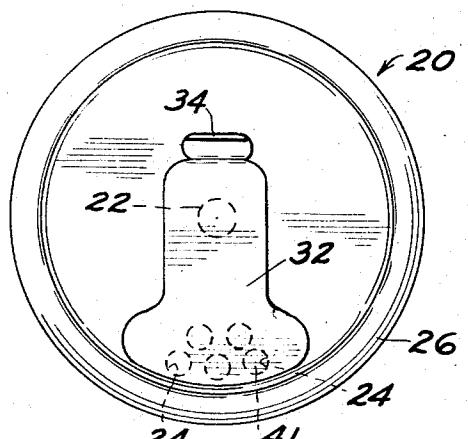


FIG-3

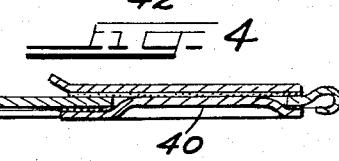
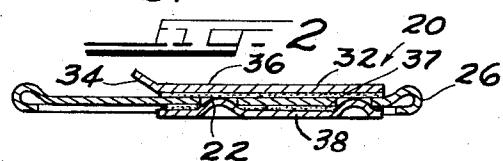
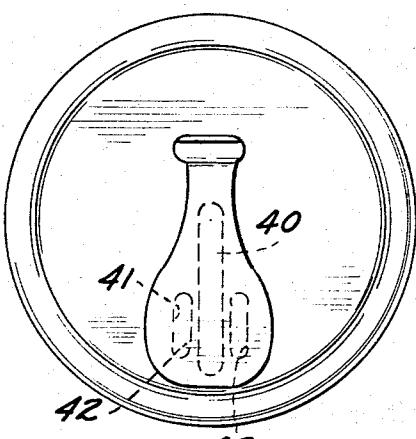


FIG-8

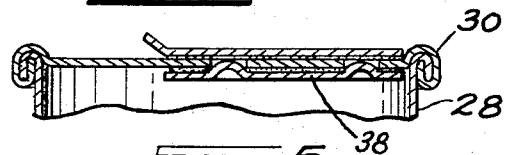


FIG-5

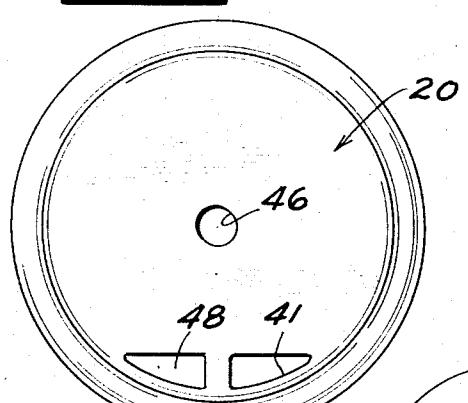


FIG-6

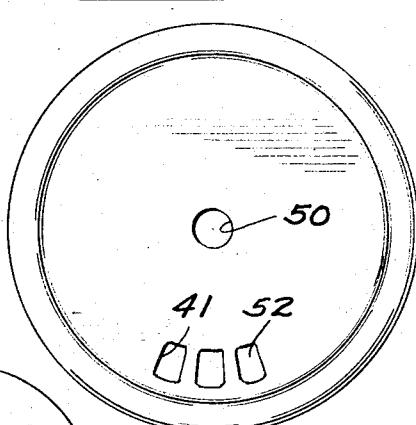


FIG-7

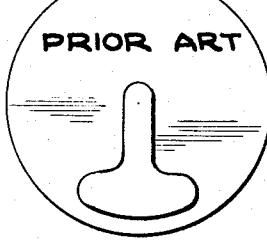
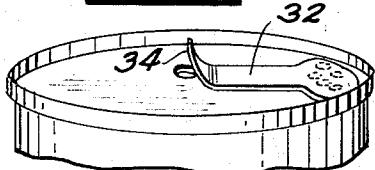


FIG-9

INVENTOR.  
ROBERT STUART

BY  
*James T. FitzGibbon*

774-

# United States Patent Office

3,292,828

Patented Dec. 20, 1966

1

3,292,828

## EASY OPENING CAN END

Robert Stuart, Chicago, Ill., assignor to National Can Corporation, Chicago, Ill., a corporation of Delaware

Filed Sept. 17, 1964, Ser. No. 397,117

2 Claims. (Cl. 222—485)

The present invention relates to metal containers with easy opening ends; and particularly to containers wherein the can end includes a plurality of openings therein, which are sealed by a removable cover means in the form of a gas-impermeable metal foil tape, or a plastic tape, or a plastic tape including a metal foil covering thereon, or associated therewith.

Easy opening ends are known to possess the highly desirable advantage of convenience, and many millions of such can ends are manufactured each year. However, all varieties of prior known can ends have certain disadvantages. For example, a can end made of tinplate and containing a tear tab generally requires too much strength and effort from the person attempting to open it. Scored aluminum ends open readily but are more expensive than tinplate ends. Such ends are also very difficult to manufacture at high speeds and still maintain the requisite quality control. Composite ends made of tinplate with a tearable aluminum insert are known, but such ends are complex and expensive. In all ends wherein the tear tab is attached directly to the removable portion of the can end, it is obviously feasible to remove only one section of the can for each tear tab. Accordingly, metal easy opening can ends of the prior art generally featured a long opening with a widened portion adjacent the peripheral edge thereof, in order to meet the triple requirement that (a) a reasonable volume be pourable therefrom in a short time, (b) a vent opening be provided, and (c) the removable strip comprise a single or unitary piece. Can ends have been described which included a removable plastic tape or the like placed over the opening, but no such units have attained commercial success, largely because tape strong enough to withstand the required pressures was too thick, and, in many cases, plastic tapes are far too gas-permeable in reasonable thickness to be practical. Accordingly, the present invention proposes to provide a can end which has the advantages of simplicity, safety, and economy.

The present invention provides a can end in which the removable element which is thrown away does not constitute a safety hazard, as for example, on beaches or in picnic areas where such cans are often used.

The present invention also provides a can end with multiple openings therein, and in which the openings are covered with a gas-impermeable, but hand removable tape cover member.

The present invention provides an easy opening can end with a plurality of openings adjacent the outer edge of the end, so that beer and like beverages poured therethrough are given a chance to release, during pouring thereof, some of the carbonation contained therein, resulting in a glass of beer with a creamy, thick "head" of foam which is preferred by users thereof and which is recommended by brewers.

The can ends made in accordance with the present invention provide greater strength against tearing from internal pressure by reason of the relatively small distances required to be spanned by the tape. Can ends according to the present invention offer definite safety advantages, insofar as the users thereof, particularly small children, are unlikely to injure their tongues or fingers by having them undesirably caught in or cut by the plurality of relatively small openings provided in the novel can end of the present invention.

2

Other advantages of the present invention will become more apparent when considered in conjunction with a description of the preferred embodiments of the present invention, and when considered in conjunction with the drawings, in which like reference numerals indicate corresponding parts throughout, and in which:

FIG. 1 is a top plan view of a can end of the present invention,

FIG. 2 is a vertical sectional view of a can end of FIG. 1 and taken along lines 2—2 thereof,

FIG. 3 is a top plan view of a modified form of the invention,

FIG. 4 is a vertical sectional view of the embodiment of FIG. 3, taken along line 4—4 thereof,

FIG. 5 is a top plan view of a modified form of the invention,

FIG. 6 is a top plan view of a modified form of the invention,

FIG. 7 is an isometric view of a portion of the can and end therefor, constructed according to the present invention,

FIG. 8 is a vertical sectional view of a can containing the can end of the present invention,

FIG. 9 is a top plan view of a can end of the prior art.

Referring now to the drawings in greater detail, there is shown generally, in FIGS. 1 and 2, a can end 20, with a generally centrally disposed vent opening 22 therein, and including a plurality of pour openings 24 located adjacent the peripheral edge of the can end. A can end hook portion 26 facilitates seaming the end 20 onto the body of a conventional so-called tin can 28, to form an ordinary double seam 30, FIG. 8.

Covering the openings 24, 22 on the exterior thereof is a tape 32 comprised of a thin aluminum foil, or of a plastic material with a thin aluminum foil attached thereto or deposited thereon. The tape 32 may also be made of a thin steel foil, as referred to in greater detail herein. An adhesive-free upturned or finger tab portion 34 of the tape 32 is adapted to be grasped by the fingers of the user. Adhering the tape 32 to the end 20 in the regions adjacent the openings 22, 24, is a layer of a suitable adhesive 26, typical compositions of which will be referred to in greater detail herein.

In the preferred embodiment, the can end of the present invention also includes an inner tape 38 attached by an adhesive 37 to the regions adjacent the openings 22, 24, and this inner tape 38 extends in use somewhat through the openings 22, 24 where it is strongly adhesively attached to the outer tape 32. In the use of the easy opening can end, when the outer tape is removed, that portion of the inner tape 38 which is strongly adhered to the outer tape will remain affixed thereto and thus be pulled through the openings 22, 24, whereas the portion of the tape 38 which is attached to the interior of the can end will remain attached thereto, the two portions being cut apart by the cutting action of the raw metal edge portions 41 of the openings 22, 24. Thus, the inner tape 38 is strongly adhered to the outer tape 32, but the inner tape 38 is much lower in tensile strength and particularly shear resistance than is the outer tape 32, so that the inner tape 38 will be torn off around the marginal edge portions 41 of the openings 22, 24, thus leaving the openings 22, 24 unobstructed.

The provision of the lower tape 38 not only adds to the strength provided by the use of the outer tape 32, but also prevents undesired contact between the product in the container and the raw metal edges 41 of the container. Thus, the inner tape 38 may be dispensed with in cases where there is no substantial internal pressure, or where there is a vacuum, and where there is no objec-

tion to contact between raw metal edges 41 of the can and the product contained in the can. Such tape is also not required where other means of protecting the raw edge 41 is provided. The composition and characteristics of the inner tape 38 will be referred to in greater detail herein.

FIG. 3 shows an alternate form of the invention, wherein one opening serves not only as the central vent opening 40, but also extends to the outer periphery of the can end, where it is surrounded by two smaller openings 42. Thus, the functions of the openings are retained, but the openings are sufficiently narrow to retain the desirable safety features referred to above.

FIG. 5 shows a somewhat different form of the invention, wherein a single central vent opening 46 is provided in the center of the can end 20 and two relatively small, contoured pour openings 48 are provided in the periphery of the end 20.

FIG. 6 shows an embodiment of the invention wherein a central vent opening 50 and three peripheral pour openings 52 are provided in the can end 20.

It will be understood that considerable variations may be made in the size and shapes of openings, provided that they are not so numerous so as to cause excess foaming of the product therein, and provided that they are located within a sufficiently narrow sector or circumferential portion of the can end to permit ready drinking of the contents by a person directly from the can.

Although it is possible to locate the vent or air opening adjacent a different edge, for example, the opposite edge of the can, this construction is not preferred because it unduly lengthens cover tape, and provides no added advantages. The tapes I have used for the exterior cover are gas-impermeable and hence contain at least some metal, in one form or another.

For example, a 5 mil (0.005 inch) low tensile dead soft aluminum foil, with a heat activatable adhesive thereon in a thickness of 1 to 2 mils (.001 to .002 inch), was used. A tape of this sort showed sufficient strength and was thin enough to be flexible and readily strippable from the can end.

Another exterior tape which I found satisfactory was a 5 mil (0.005 inch) metallized polyester tape, the metal being a vacuum applied or so-called vacuum metallized aluminum which serves as a vapor barrier.

Another satisfactory exterior tape was a 2 mil (0.002 inch) steel foil, which is somewhat stiffer than aluminum, but which was also satisfactory.

The adhesives used were heat activatable or hot melt adhesives, which were generally thermoplastic polyester or polyvinylacetate type adhesives. It has also been found that modified vinyl adhesives were satisfactory. The criterion is that the tape be strippable from the can end, that is, a somewhat plastic adhesive in the finished state is required. On the other hand, the adhesive must adhere strongly to the inner tape, if one is used. I have found that many such thermoplastic adhesives are available, for example, Minnesota Mining and Manufacturing Co.'s No. 6 thermoplastic adhesive, or a No. 5 thermoplastic adhesive from the same company. Some additional satisfactory adhesives are creep-resistant pressure-sensitive adhesives, namely those which contain rubber or rubbery polymers.

Another suitable tape cover system comprises, for example, a polyester film (Mylar) with an aluminum foil coating vacuum deposited on the top thereof, and with a second composite polyethylene-polyvinyl acetate adhesive film attached to the bottom of the Mylar tape, and in which the polyvinyl acetate adhesive is on the bottom surface of the polyethylene. Thus, the polyethylene is integrally and non-strippably bonded to the Mylar. The thus formed composite tape is removably or strippably bonded to the can end, and the entire tape is covered with a thin, vacuum deposited aluminum coating. Ap-

proximately a 2 mil (0.002 inch) coating of adhesive proved satisfactory with the tapes I used.

For the inner tape, I have found that a polyvinyl chloride ("vinyl") film of a thickness of about 2 to 4 mils (0.002 to 0.004 inch) is preferred. Since I used sealing temperatures of from 200° F. to about 375° F., I found that the vinyl type inner film gave the best combination of tear qualities, heat resistance, bond to the interior of the can end, and bond to the exterior tape.

Although polyethylene terephthalate (Mylar), nylon, polyethylene and other thermoplastic films were operable as inside tapes, the vinyl seemed most compatible with the greatest number of interior can end finishes. These interior finishes may be vinyl coatings, epoxy coatings, phenolic coatings, or combinations thereof, and these ends may also be coated with a wax layer on top of the vinyl or other can end finish.

In adhering the tapes to the can ends, pressures varying from 0 up to 200 p.s.i.g. were used, with the temperatures varying, as stated above from about 200° F. to 375° F., depending on the exact composition of the adhesive and the nature of the coating on the can end. As will be understood, the desired temperature is one which is sufficient to soften somewhat the coating on the can end to increase adhesion of the tape thereto. The pressures may vary greatly and the pressures referred to above are merely illustrative of those which operated satisfactorily. In some cases in which a vinyl inner tape was used, the can end inner coating material was sufficiently compatible with the vinyl inner tape that a satisfactory bond was achieved without using any adhesive whatever.

Finished can ends constructed in accordance with the foregoing have been substantially completely gas-impermeable, have resisted blow-out or tensile failure of the end up to more than 100 p.s.i. (gauge), and yet, by reason of the novel design and location of the openings, such ends are easy and convenient to open.

As is well known in the art, can ends such as those described and claimed herein need not be limited in their application to being separate can ends which are attached to a conventional can body. For example, cans are now known which are sometimes referred to as two piece cans, in which the can body and bottom wall are of one piece, and the top cover portion is another piece which is attached thereto, as by a double seam, or otherwise.

Thus, it will be appreciated that although a can end such as that described herein could be made and attached to the open end of such a can, the advantages of the present invention could also be attained by placing the openings such as those described herein, in the bottom or integral wall of a can, and then seaming a noneasy opening or conventional end to the other end of the container. Thus, in forming a so-called deep drawn or impact extruded can, it is possible to punch the openings in the bottom of the can, affix the tapes thereto as described herein, and then, in use, invert the can and remove the tab from what would otherwise normally be considered the bottom of the can. It will be noted in this connection that a can such as this would possess an easy opening feature at one end and could also possess a conventional opening feature at the other end, inasmuch as there is no double seam or chime at the bottom of a two piece can to which to attach an ordinary opening tool.

It is also possible that the metal element of the tapes could be eliminated, for example, in the event that gas retention is not a criterion in selecting the can and the end, or if more highly gas-impermeable plastic materials are developed, and yet such a can will possess the advantages of easy opening and the novel location and configuration of the openings therein and have all the advantages associated therewith.

It will thus be seen that the present invention, as described above and as shown in the drawings, provides a safe, economical, and desirable easy opening can end having desirable advantages and characteristics including

those herein before pointed out and others which are inherent in the invention. Certain modifications and changes will be apparent to those skilled in the art and I contemplate that such may be made without departing from the spirit of the invention or the scope of the appended claims.

I claim:

1. An easy opening can adapted to hold carbonated beverages therein under pressure when a second end is permanently attached thereto in pressure-tight relation, comprising, in combination, 10
  - (a) a cylindrical metal body portion, and
  - (b) an easy opening first end fixedly attached to said body portion, said easy opening end comprising,
    - (1) a substantially flat end portion including outer peripheral edge portions thereof, said peripheral edge portions being fixedly attached to an end of said metal body portion by a permanent seam, 15
    - (2) at least one air vent opening with at least a portion thereof disposed generally centrally of said can end,
    - (3) a plurality of pour openings disposed closely adjacent one another and with at least portions thereof disposed adjacent said outer edge portions, all of said pour openings being located within a sector of said end portion which is subtended by an angle of not substantially greater than 90°, 20
    - (4) a gas-impermeable exterior tape portion, including a finger-tab-containing end portion therein, said tape portion comprising a flexible metal tape of a thickness less than 0.006" and made from a material of the class consisting of steel and aluminum, said tape portion covering all of said openings and being removably attached to the exterior surface of said can end, 25
    - (5) an organic adhesive composition attaching said tape to said end portion,
    - (6) inner seal means of an organic plastic material covering all of said openings, said seal means covering an area of less than half of the interior surface of said can end portion.
2. An easy opening metal can including a carbonated beverage therein comprising, in combination, 45
  - (a) a cylindrical metal body portion,
  - (b) a first metal end portion permanently seamed in liquid-tight relation to one end of said cylindrical metal body portion, and
  - (c) an easy opening second end fixedly attached to said body portion, said easy opening end comprising, 50

- (1) a substantially flat end portion including outer peripheral edge portions thereof, said peripheral edge portions being fixedly attached to an end of said metal body portion by a permanent seam,
- (2) at least one air vent opening with at least a portion thereof disposed generally centrally of said can end,
- (3) a plurality of pour openings disposed closely adjacent one another and with at least portions thereof disposed adjacent said outer edge portions, all of said pour openings being located within a sector of said end portion which is subtended by an angle of not substantially greater than 90°,
- (4) a gas-impermeable exterior tape portion, including a finger-tab-containing end portion therein, said tape portion comprising a flexible metal tape of a thickness less than 0.006" and made from a material of the class consisting of steel and aluminum, said tape portion covering all of said openings and being removably attached to the exterior surface of said can end,
- (5) an organic adhesive composition attaching said tape to said end portion,
- (6) inner seal means of an organic plastic material covering all of said openings, said seal means covering an area of less than half of the interior surface of said can end portion.

#### References Cited by the Examiner

##### UNITED STATES PATENTS

201,939	4/1878	Nolty	-----	220—53
2,048,859	7/1936	Grove	-----	222—482
2,519,371	8/1950	Hexter	-----	222—575 X
2,606,694	8/1952	Galletta	-----	222—478 X
2,776,787	1/1957	Nicol	-----	222—565 X
2,870,935	1/1959	Houghtelling	-----	220—53
3,036,746	5/1962	Hagen	-----	222—484 X
3,139,646	7/1964	Vernon	-----	222—541 X
3,154,225	10/1964	Wadlinger et al.	-----	222—485
3,217,951	11/1965	Paal	-----	222—566 X

##### FOREIGN PATENTS

524,688	8/1940	Great Britain.
---------	--------	----------------

ROBERT B. REEVES, Primary Examiner.

CHARLES R. CARTER, Examiner.

K. N. LEIMER, Assistant Examiner.